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Name: John S. Economou
Signature:

Applicant : Ma, et al.

Serial No. : 09/781,529

Filed : February 9, 2001

For : A PRINTING CONTROL INTERFACE SYSTEM AND METHOD WITH HANDWRITING DISCRIMINATION CAPABILITY

LETTER TO OFFICIAL DRAFTSPERSON

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Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicants hereby submit formal drawings for the above-captioned matter.

No fees are believed to be necessary for the submission of these substitution drawing sheets. However, if fees are due, please debit Deposit Account No. 01-1785. Any refund should be credited to the same account.

Respectfully submitted,

AMSTER, ROTHSTEIN & EBENSTEIN
Attorneys for Applicants
90 Park Avenue
New York, New York 10016
(212) 697-5995

By:
John S. Economou
Registration No. 38,439

Dated: New York, New York
April 1, 2002

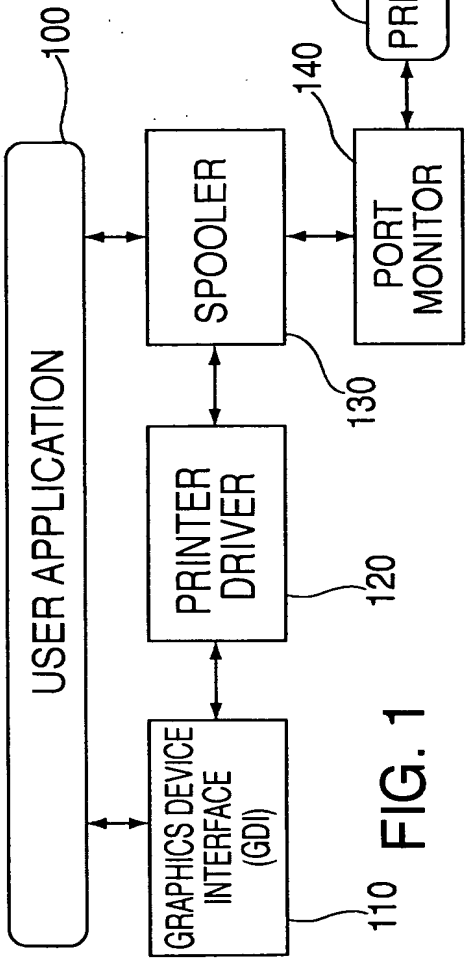
USER APPLICATION
100
GRAPHICS DEVICE INTERFACE (GDI)
110
PRINTER DRIVER
120
SPOOLER
130
PORT MONITOR
140
PRINTER
150

FIG. 1

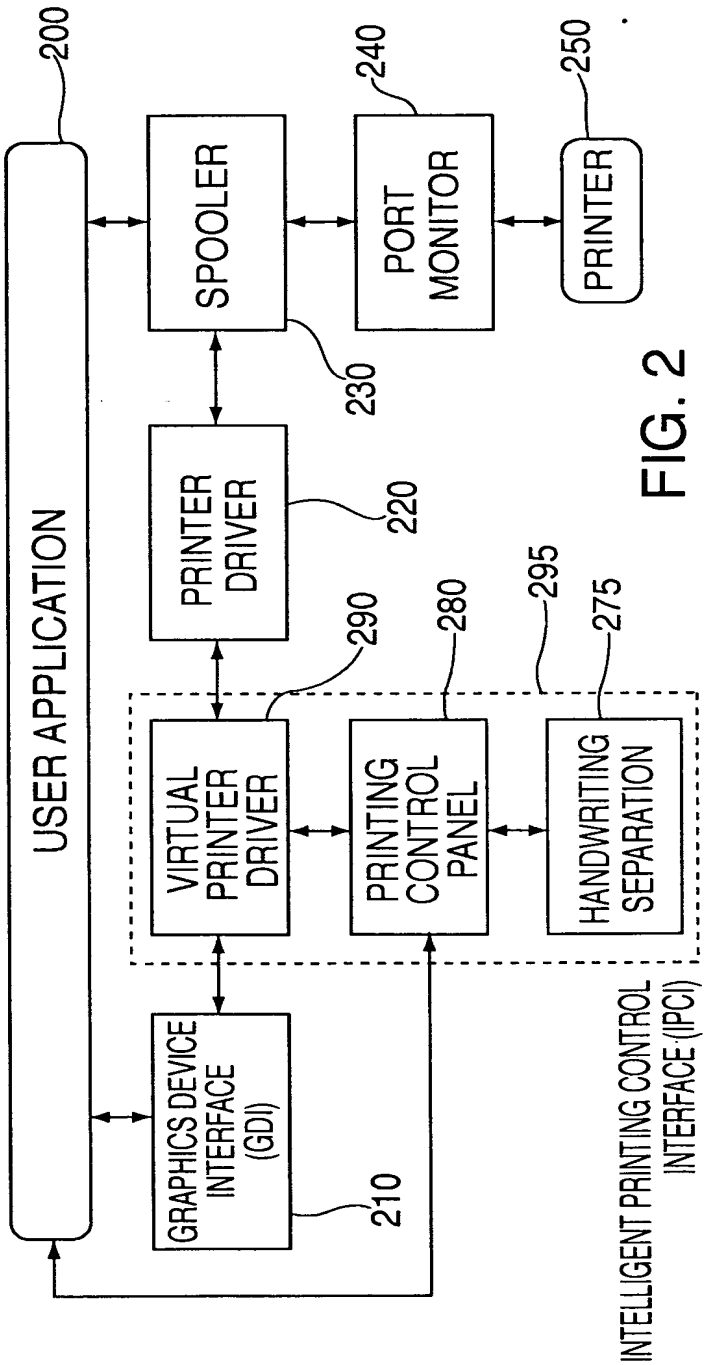
200
USER APPLICATION
GRAPHICS DEVICE INTERFACE (GDI)
210
PRINTER DRIVER
220
SPOOLER
230
PORT MONITOR
240
PRINTER
250
VIRTUAL PRINTER DRIVER
290
PRINTING CONTROL PANEL
280
HANDWRITING SEPARATION
295
275
INTELLIGENT PRINTING CONTROL INTERFACE (IPCI)

FIG. 2

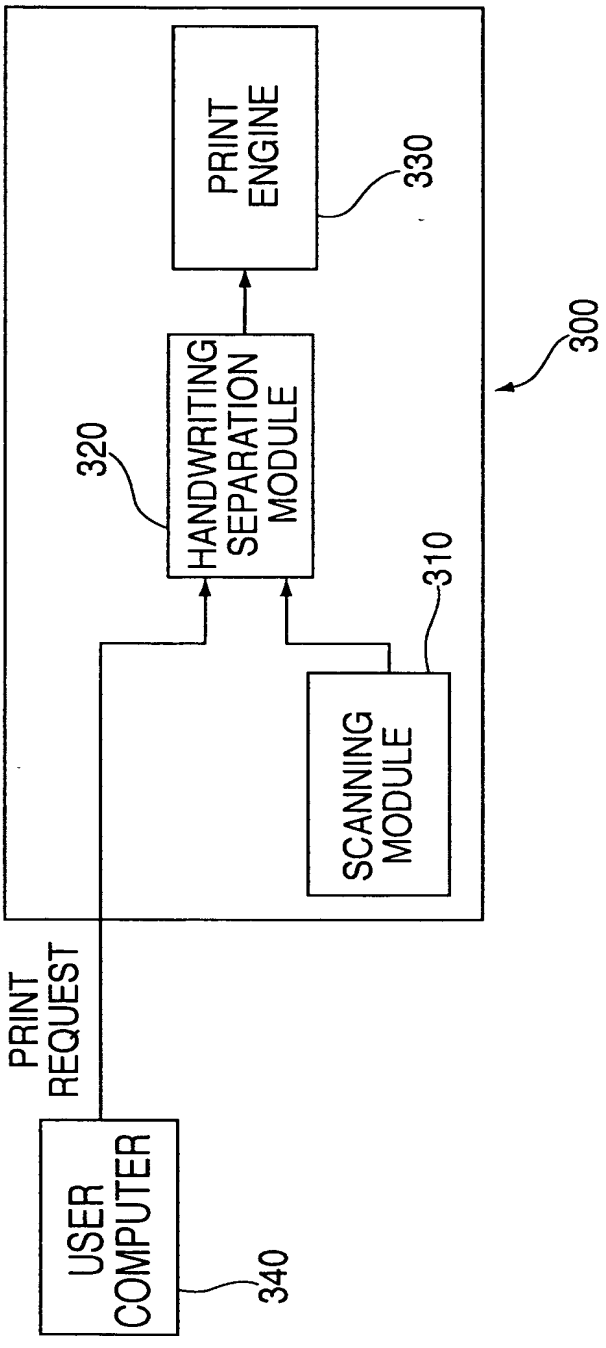
PRINT ENGINE
330
300
320
HANDWRITING SEPARATION MODULE
310
SCANNING MODULE
PRINT REQUEST
USER COMPUTER
340

FIG. 3

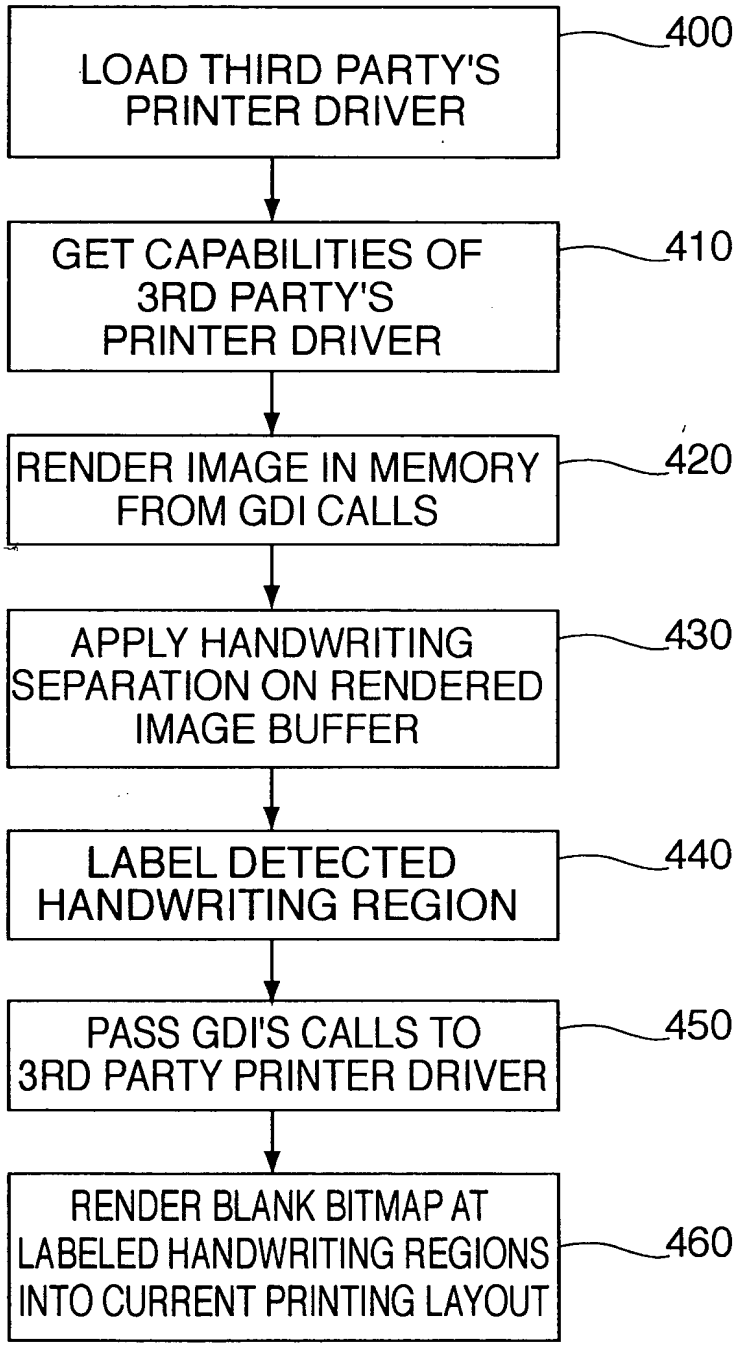
LOAD THIRD PARTY'S PRINTER DRIVER
400
GET CAPABILITIES OF 3RD PARTY'S PRINTER DRIVER
410
RENDER IMAGE IN MEMORY FROM GDI CALLS
420
APPLY HANDWRITING SEPARATION ON RENDERED IMAGE BUFFER
430
LABEL DETECTED HANDWRITING REGION
440
PASS GDI'S CALLS TO 3RD PARTY PRINTER DRIVER
450
RENDER BLANK BITMAP AT LABELED HANDWRITING REGIONS INTO CURRENT PRINTING LAYOUT
460

FIG. 4

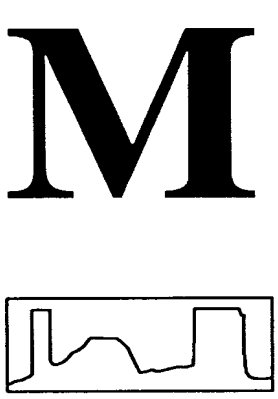

FIG. 5A

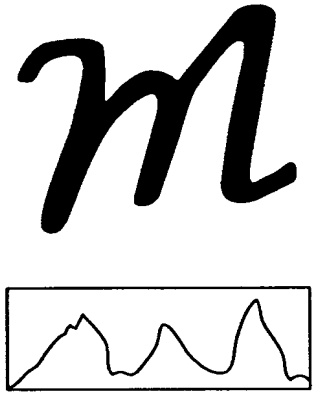

FIG. 5B

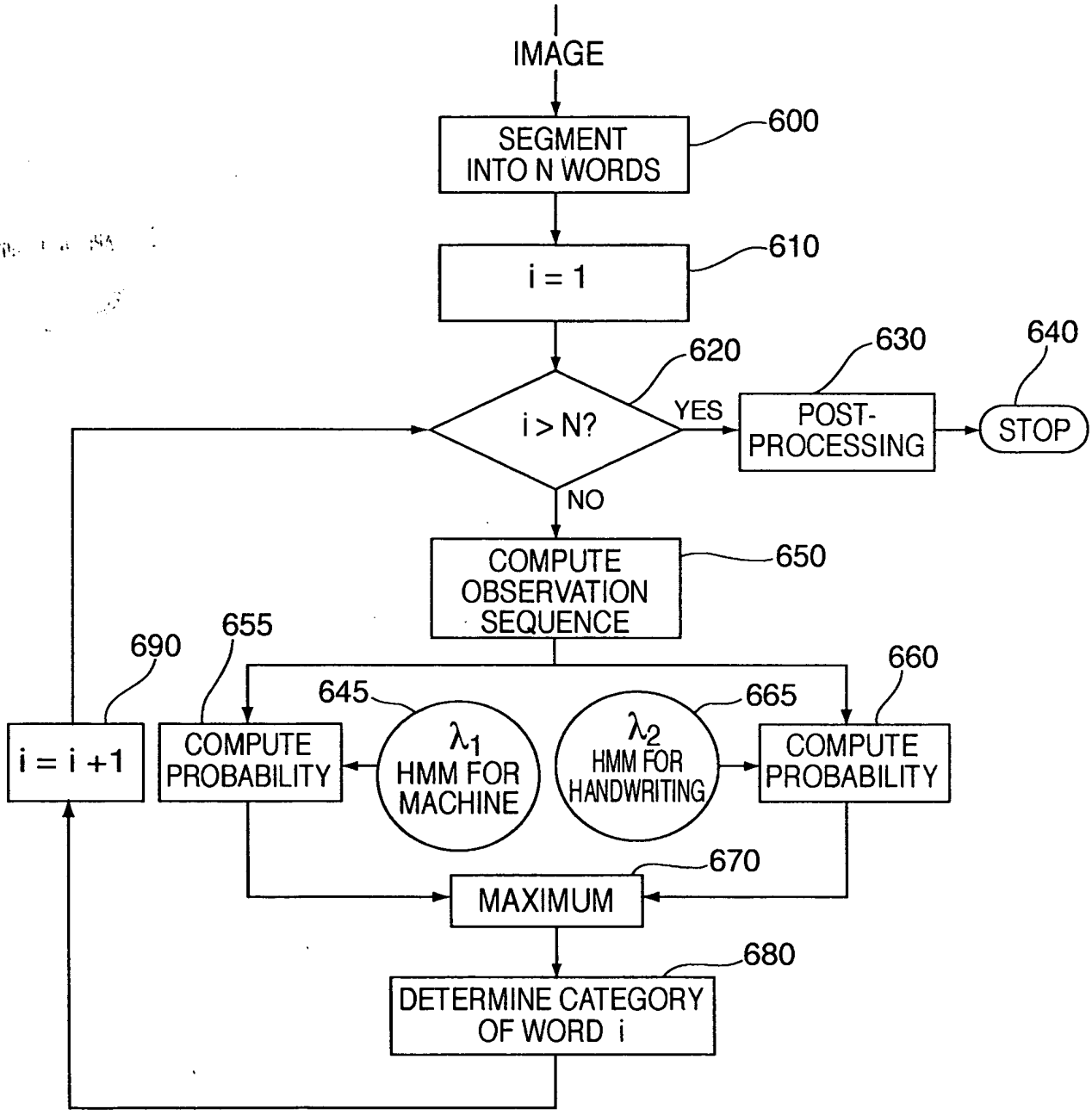
IMAGE
SEGMENT INTO N WORDS
600
i = 1
610
620
630
640
i > N?
YES
POST-PROCESSING
STOP
NO
COMPUTE OBSERVATION SEQUENCE
650
655
690
660
645
665
i = i +1
COMPUTE PROBABILITY
λ1 HMM FOR MACHINE
λ2 HMM FOR HANDWRITING
COMPUTE PROBABILITY
670
MAXIMUM
680
DETERMINE CATEGORY OF WORD i

FIG. 6

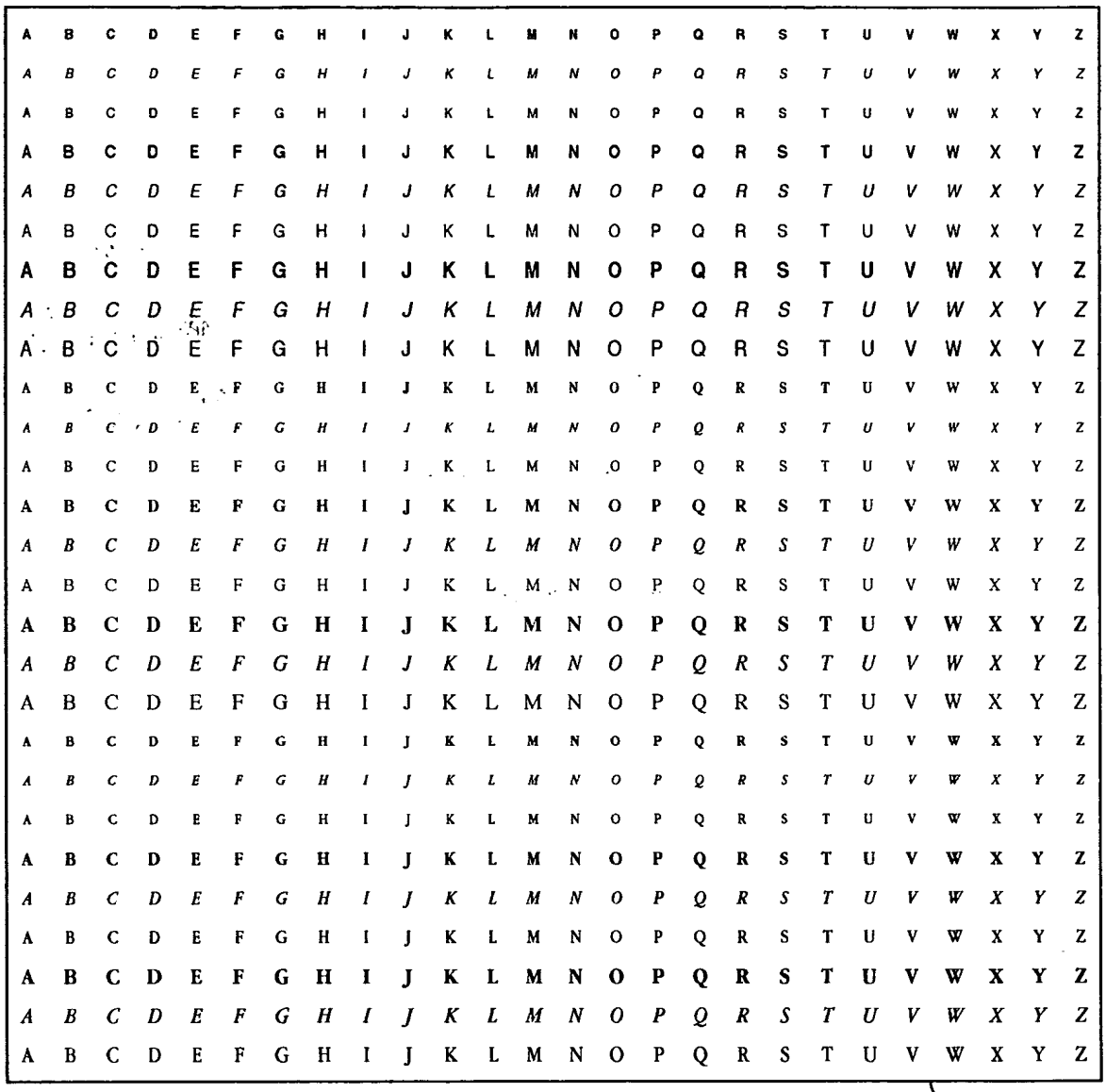

FIG. 7

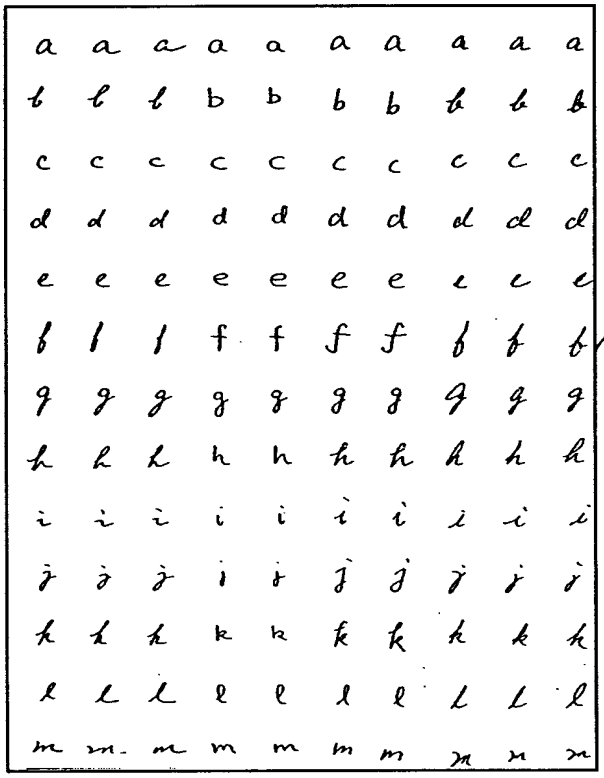

FIG. 8

900

Detecting and Utilizing Add-on Information From a Scanned Document Image

Matthew Ma and Katherine Guo
Panasonic Information and Networking Technologies Laboratory
Panasonic Technologies, Inc.
Two Research Way
Princeton, NJ 08540, USA
[mma,kguo]@research.panasonic.com

PINTL-IM-142-099 ← register
March 27, 2000

Abstract

A method for detecting and separating add-on handwritten annotations from a scanned document image is presented. This method combines the projection histogram and line merge techniques in order to discriminate between printed text lines and handwritten annotations. The example shows that it works with simple text documents with handwritten annotations on margin areas or white space within the main text. The algorithm, however, can be extended in order to handle more complex scenarios.

Please expand

Keywords: Handwritten annotation detection, Handwritten annotation separation, Scanned image, Projection histogram, Connected component, Line merge.

FIG. 9

910

Detecting and Utilizing Add-on Information From a Scanned Document Image

915

Matthew Ma and Katherine Guo
Panasonic Information and Networking Technologies Laboratory
Panasonic Technologies, Inc.
Two Research Way
Princeton, NJ 08540, USA
mma,kguo@research.panasonic.com

PINTL-IM-1142-099 ← register
March 27, 2000

Abstract

A method for detecting and separating add-on handwritten annotations from a scanned document image is presented. This method combines the projection histogram and line merge techniques in order to discriminate between printed text lines and handwritten annotations. The example shows that it works with simple text documents with handwritten annotations on margin areas or white space within the main text. The algorithm, however, can be extended in order to handle more complex scenarios. Please expand.

Keywords: Handwritten annotation detection, Handwritten annotation separation, Scanned image, Projection histogram, Connected component, Line merge.

FIG. 10

920

Detecting and Utilizing Add-on Information From a Scanned Document Image

Matthew Ma and Katherine Guo
Panasonic Information and Networking Technologies Laboratory
Panasonic Technologies, Inc.
Two Research Way
Princeton, NJ 08540, USA
[mma,kguo]@research.panasonic.com

925

PINTL-IM-142-099
March 27, 2000

930

Abstract

A method for detecting and separating add-on handwritten annotations from a scanned document image is presented. This method combines the projection histogram and line merge techniques in order to discriminate between printed text lines and handwritten annotations. The example shows that it works with simple text documents with handwritten annotations on margin areas or white space within the main text. The algorithm, however, can be extended in order to handle more complex scenarios.

Keywords: Handwritten annotation detection, Handwritten annotation separation, Scanned image, Projection histogram, Connected component, Line merge.

FIG. 11